Original Research

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Relationship of percutaneous tracheostomy timing with APACHE II and SOFA scores on the first day of ICU for critically ill patients

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ABSTRACT

Objective: Our study aimed to assess the relation between APACHE II and SOFA scores of critically ill patients on their first day of admission and the timing of percutaneous dilatational tracheotomy (PDT).

Methods: Following approval of the Ethics Board of Health Sciences University Istanbul Bağcılar Educational Research Hospital (25.08.2016-2016/495), data of all 91 patients who had been treated with PDT in the ICU between June 1, 2014 and June 1, 2016 have been retrospectively evaluated. We recorded the following information: demographical data (such as age, sex, body mass index) that could be obtained from patient records, APACHE II and SOFA scores on their first day in ICU, and PDT timing.

Results: There was no statistically significant difference observed between the timing of the PDT and APACHE II and SOFA scores (p>0.05).

Conclusion: Our results showed that most of the patients with PDT had an APACHE II score of 15-24. We noticed that the number of patients with an APACHE II score of 24 and higher was notably lower than the number of patients with scores between 15-24. The fact that the life expectancy for the patient group with a high APACHE II score is low may call the tracheostomy decision into question. On the other hand, no relation was found between differences in APACHE II and SOFA scores and the starting time of PDT.

Keywords: Tracheostomy, mortality score, timing, critical care, APACHE

ÖZ

Kritik hastaların yoğun bakım ünitesinin ilk günlerindeki APACHE II ve SOFA skorları ile perkütan trakeostomi zamanlaması arasındaki ilişki

Amaç: Çalışmamızda Yoğun Bakım Ünitesi (YBÜ)'nde Perkütan Dilatasyonel Trakeostomi (PDT) uygulanan hastalarda, ilk gün ölçülen APACHE II ve SOFA skorlama sistemleri ile PDT uygulanma zamanı arasındaki ilişkinin araştırılması amaçlandı.

Yöntem: Sağlık Bilimleri Üniversitesi (SBÜ) İstanbul Bağcılar Eğitim ve Araştırma Hastanesi Etik Kurulu onayı (25.08.2016-2016/495) alındıktan sonra, YBÜ'nde 01.06.2014-01.06.2016 tarihleri arasında PDT uygulanan 91 hastanın verileri retrospektif değerlendirildi. Hastaların demografik verileri (yaş, cinsiyet, vücut kitle indeksi), yoğun bakıma yatışındaki ilk gün APACHE II ve SOFA skorları ile PDT açılma günleri kaydedildi.

Bulgular: Hastaların PDT açılma zamanları ile APACHE II ve SOFA skorları dağılımları arasında istatistiksel olarak anlamlı farklılık gözlenmemiştir (p>0,05).

Sonuç: Elde ettiğimiz sonuçlar, PDT açılan hastaların çoğunun ilk gün APACHE II skorları 15-24 arasında olduğu görüldü. 24 ve üzeri APACHE II skoruna sahip hastaların sayısı, 15-24 skoruna sahip hastalardan belirgin olarak azdı. Yüksek APACHE II skoru olan hastaların yaşam beklentisinin düşük olması PDT kararını sorgulatabilir. Öte yandan, APACHE II ve SOFA skorları arasındaki farklılık ile PDT açılma zamanı arasında bir ilişki saptanmamıştır.

Anahtar kelimeler: Trakeostomi, mortalite skoru, zamanlama, yoğun bakım, APACHE

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Introduction

Even though the timing of using percutaneous dilatational tracheotomy (PDT) in critically ill patients who are attached to mechanical ventilators in the intensive care unit (ICU) is controversial, it is advised to perform the intubation on the 3rd or 4th day in case the mechanical ventilation period exceeds 21 days and extubation is not completed in cases with a low Glasgow Coma Scale (GCS) score with serious multi-trauma and/or head traumas (1,2). Even though it is not decisive, it is possible to conclude that the general condition of the patients determines the timing of the PDT (3,4).

Our study aims to assess the relation between critical ill patients' APACHE II and SOFA scores on their first day of ICU and the timing of PDT.

Material and Method

Following approval of the Ethics Board of Health Sciences University Istanbul Bağcılar Education and Research Hospital (25.08.2016-2016/495), data of all 91 patients who had been treated in the ICU with PDT between June 1, 2014 and June 1, 2016 have been retrospectively evaluated.

In the light of the timing of the PDT, patients who had PDT after their 10th day have been defined as Group 1 and patients who had PDT in their first 10 days as Group 2.

We recorded the following information: demographical data (such as age, sex, body mass index) that could be obtained from patient records, APACHE II and SOFA scores for their first day in ICU and PDT timing.

Statistical Analysis

SPSS 16.0 was used to evaluate the data statistically. The data was tested for normal distribution using the Kolmogorov-Smirnov Z test. As the data was found to be not normally distributed, two non-parametric tests, Kruskal-Wallis and Chi-Square test, were used to compare the data between the groups. Mann Whitney U test is applied for the binary-group analysis whereas for the intra-group APACHE II-SOFA values Wilcoxon two-sample test has been chosen. The results are shown in mean ± standard distribution and numerical distribution. Differences with $p<0.05$ were considered statistically significant.

Results

When the demographic data of the patients was assessed, no significant differences were observed between the groups ($p>0.05$) (Table 1).

Causes for the admission to ICU are showed in Table 2.

No statistically significant difference was observed between the timing of the PDT and APACHE II and SOFA scores ($p>0.05$) (Table 3).

Table 1: Demographic data of the patients

	Group 1 n=57		Group 2 n=34		p
Age (years)	62.51±17.17		58.24±20.74		0.291
Sex					
Male	39	(68.42%)	21	(61.76%)	0.517
Female	18	(31.58%)	13	(38.24%)	
BMI (kg/m²)	26.87±2.56		25.99±6.45		0.363

Table 2: Causes of admission to ICU

n=91 (100%)	Group 1 n=57	Group 2 n=34	p
Sepsis/Septic Shock (14.28%)	8	5	>0.05
Post Cardiac Arrest Syndrome (PcAS) (5.49%)	3	2	>0.05
Acute Respiratory Syndrome (27.47%)	16	9	<0.05
Multiple Organ Disease Syndrome (MODS) (9.89%)	6	3	<0.05
Acute Renal Failure (9.89%)	7	2	<0.05
Multitrauma (24.17%)	12	10	>0.05
Others (8.81%)	5	3	>0.05

Table 3: PDT and APACHE II and SOFA scoring scales.

	Group 1 n:57		Group 2 n:34		p
APACHE SCORE					
0-14	10	(17.54%)	2	(5.88%)	0.265
15-24	34	(59.65%)	22	(64.71%)	
>24	13	(22.81%)	10	(29.41%)	
SOFA SCORE					
0-4	20	(35.09%)	9	(26.47%)	0.435
5-9	36	(63.16%)	23	(67.65%)	
>9	1	(1.75%)	2	(5.88%)	

Discussion

For patients needing prolonged mechanical ventilation in the ICU, PDT has increasingly become the more prevalent procedure. The most common causes for PDT are respiratory deficiency and the extended use of mechanical ventilation. Percutaneous dilatational tracheotomy is the procedure most often performed on critically ill patients, with as many as 24% of patients requiring this practice in the ICU (5-7).

The timing of PDT is determined by several factors including the patient's clinical condition, the decision of the physician, and consultation with the family of the patient (8,9). Some physicians have advised in the recent American College of Chest Physicians (ACCP) guidelines (10) that PDT should be an option when there has been a stabilized period on the ventilator, and when it becomes clear that the patient requires protracted ventilator assistance.

There is no widely accepted recommendation covering all patient groups and diagnoses related to the timing of PDT. For this reason, the timing of PDT is decided by the ICU specialist who is responsible for the evaluation of the patient and the clinical situation. The general practice concerning the timing of PDT in the presence of a pathology (neurological damage, progressive muscle diseases, medulla spinalis injuries, masses causing respiratory obstruction, etc.) in cases that are not likely to be extubated is to perform the procedure as soon as possible after admission to the ICU (11-14).

In our study, respiratory failure was most commonly caused by neurologic disorders. In a neurologic ICU case with a low level of consciousness and reduced capability to guard the airway, a PDT will most likely be carried out (15-17).

The APACHE II scores of patients with PDT are usually between levels 15 and 24. The study conducted by McHenry et al. (18), in parallel with our results reports that most of the patients with PDT have APACHE II scores of 15-24. We have recognized that the number of patients with APACHE II scores of 24 and higher is notably lower than the number of patients with scores between 15 and 24. The fact that the life expectancy from the patient group with high APACHE II scores is low may call the tracheostomy decision into question. On the other hand, no relation was determined between differences in APACHE II scores and the starting time of PDT.

The SOFA score was determined 24 hours post admission to ICU and subsequently every 48 hours for the first 10 days. It determines multiple organ dysfunction and higher severity in critically ill patients (19). The relationship between organ dysfunction and mortality has also been demonstrated in previous studies; the initial SOFA score of critically ill patients was correlated with mortality and duration of stay in ICU (20), but it was not correlated with the PDT starting time in our study. According to the SOFA scores in our data, there had been no significant difference between PDT timing and SOFA scores on the ICU admission day.

Conclusion

Our study did not determine any effect of APACHE and SOFA scores on the timing of the start of PDT (whether it is performed at an earlier or a later stage).

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